Three explanations may be offered: First, that we are passing through a period of less rainfall than formerly. Second, that the disastrous change is due to disturbing the former balance of natural conditions by removal of the forests. Third, that much of this missing water has been used before it reaches the point or points at which the estimates were made. It is on the second of these explanations that Dr. Rothrock lays the most weight.

Miss Ormerod, of Torrington-house, St. Albans, has published her annual letter on insect pests in Great Britain. She mentions, according to the London *Times*, the damage done to grass and corn crops by wireworms, leather-jackets, chafer-grubs, and the caterpillars of the small swift moth. Hessian fly and corn sawfly were reported locally. Insect attacks upon orchard and bush fruits are becoming more numerous. The codlin moth, the apple sucker and the mussel scale were all troublesome, and there is at least a probability that the American 'apple grub' has obtained a foothold in English orchards. The wood of plum trees was tunnelled by shot-borer beetles, and the foliage of cherry and pear trees was ravaged by the small slug-like larva of the pear sawfly. The more conspicuous pests of timber trees is the 'timber-man' beetle and the elm-bark beetle. A matter of special interest is the risk incurred by a large importing country like England of bringing within its borders exotic pests which happen to infest produce grown abroad. Several illustrations of this are incidently given by Miss Ormerod. Thus, the larva of the Angoumois moth was brought to England in barley imported from North Africa. The Mediterranean mill moth was found in flour shipped from an Adriatic port, and this exceedingly troublesome pest is undoubtedly establishing itself—it is to be feared permanently—in flour mills and flour stores. Locusts are present in considerable numbers in Lucerne hay from Argentina, and a case is mentioned in which three horses fed on such hay fell ill, but recovered when the hay was discontinued. The 'German cockroach' is making an apparently successful invasion of English kitchens. It is much smaller than the common cockroach, is yellowish or brownish in color, and striped with dark brown.

UNIVERSITY AND EDUCATIONAL NEWS.

The report of President Eliot, of Harvard University, with the appended documents, makes a volume of some 376 pages. President Eliot lays special stress on the desirability of granting degrees in the middle as well as at the close of each academic year, urging that this would be of great importance to some classes of students. The votes of the corporation formally inviting the Massachusetts Institute of Technology to affiliate with Harvard University are given, readiness being expressed to make such modifications in the technical departments of Harvard University as may be desirable. It is suggested as of pressing importance that the medical school be removed to a new site, and that a hospital be erected as an adjunct to it. The income of the University apart from new endowments was $1,327,360.57, while the payments were $1,228,941.50.

The regents of the University of California have decided to establish a college of commerce as one of the departments at the University. President Kellogg is directed to make application to the President of the United States that an engineer officer of the United States Navy be detailed, in accordance with the Act of Congress approved in 1879, to act as instructor in the college.

At the recent meeting of the Board of Trustees of the University of Tennessee it was decided to erect a new building for the department of mechanics and two new dormitories. It was also determined to establish, in the near future, a separate school of economics.

By the death of Miss Sara M. Fletcher, of Woodstock, Vt., $6,000 is left to Dartmouth College, as provided by the late Richard Fletcher, of Boston.

The sum collected for Vassar College through the efforts of its alumnæ now amounts to $90,000, of which $50,000 will be devoted to the establishment of the Maria Mitchell chair of astronomy.

Dr. George Santayana, instructor in philosophy at Harvard University, has been appointed to an assistant professorship.

The name of the Hon. Carroll D. Wright has been added to the faculty of Dartmouth

College as lecturer on the application of statistics to social and political science; George P. McKee has been appointed instructor in physics.

PROFESSOR CHARLES R. RICHARDS, director of the manual training department of the Pratt Institute, Brooklyn, has been appointed to the chair of manual training in the Teachers' College, Columbia University.

AT the University of Cambridge, Mr. F. C. Kempson and Mr. R. H. Biffen, of Gonville and Caius College, have been appointed demonstrators of anatomy and botany respectively.

DISCUSSION AND CORRESPONDENCE.

WEATHER HARMONICS.

THE study of weather periodicity has, from the beginning of meteorology, attracted, more or less, the time and attention of students. Yet, so baffling and uncertain are the results so far produced that many have been led into the scepticism voiced by a recent writer, who remarks, 'There is, apparently, no periodicity in the recurrence of weather.' It seems to me, however, that this attitude is the same as that of a student who visited the track of a tornado, expecting to find the trees and other débris lying in perfect circles, but on finding the fallen trees lying over each other pointing in different directions, and other débris in tangled confusion, came back and announced his conviction that no whirl existed in the tornado funnel. In other words, my study of the subject for many years convinces me that it is the complexity of the data, not the absence of the phenomenon, which has induced this scepticism in regard to weather periodicity.

I am led to the conclusion, which is extremely important if true, that one of the complexities which has helped to obscure weather periodicity is the existence of what may, perhaps, be called weather harmonics, on account of the resemblance to harmonics in sound—that is, the existence of other periods related to the primary as 2, 3, 4, etc. In what follows I shall briefly outline the evidence on which this conclusion is based.

For the first examples I take the best known and only generally accepted cycles, the annual and daily periods. The first harmonic periods I wish to point out are multiples of a year, namely, two, three, four and eight years in length, all of which are continuously acting, but now and then one becomes predominant, so that it may be selected for illustration.

Thus, over the interior of the United States there were for many years very marked oscillations of pressure, temperature and humidity covering a period of about two years. These were discussed in the *American Meteorological Journal*, Vol. I., pp. 130 and 528. The data appeared at first to indicate a period about a month longer than two years, but later investigation indicates that it is more exactly two years. Three and four-year multiples have not been marked in the United States, but an eight-year period has been well marked. Thus the Chief of the Weather Bureau gives, in his latest report (1897, p. 23), the years of widespread drought in the United States during the last forty years as follows, 1860, 1863, 1870-71, 1881, 1887 and 1894-95. An eight-year series, running as follows, 1863, 1871, 1879, 1887 and 1895, takes in four out of six droughts. This seems to have been acting with the eleven-year or sun-spot period, the maxima of which occurred about 1860, 1870, 1883 and 1894, and are apparently connected with droughts in the United States. In the British Isles during the last 50 years three, four and eight-year periods appear to have been equally active, hence no simple rhythm can be selected for illustration. But I desire to call attention to one striking fact. It is well known that harmonic sound waves, after a certain number of oscillations, occur with their like phases together, and form beats, and it might be expected that harmonic weather periods, if they exist, would likewise form beats. Since 24 is a common multiple of 2, 3, 4 and 8, extremes of weather would be expected to be separated by such an interval. Now, it is a curious fact that the curves published by A. B. MacDowall, showing the number of frost days at Greenwich, show very marked extremes at this interval. For example, the greatest number of frost days were in 1855 and 1879, 24 years apart, while the least number were in 1872, 1884 and 1896, separated by intervals of 12 and 24 years. (See *Meteorological Zeitschrift*, 1897, p. 384.)

I have reason to believe there are also periods